

What is claimed is:

1. A liquid jetting apparatus comprising;
 - a head member having a nozzle,
 - a scanning mechanism that can cause the head member to relatively move with respect to the medium,
 - a liquid jetting unit that can jet liquid from the nozzle,
 - an out-of-jetting micro-vibrating-area setting unit that can set out-of-jetting micro-vibrating areas before and after a liquid-jetting area to which liquid is to be jetted from the nozzle while the head member is caused to relatively move by the scanning mechanism,
 - a micro-vibrating unit that can cause liquid in the nozzle to minutely vibrate,
 - an out-of-jetting micro-vibrating controlling unit that can cause the micro-vibrating unit to operate when the head member is located in the out-of-jetting micro-vibrating areas, and
 - a signal generating unit that can generate an out-of-jetting micro-vibrating signal as a periodical signal having a predetermined waveform,
- wherein:
 - the out-of-jetting micro-vibrating controlling unit is adapted to cause the micro-vibrating unit to operate based on the out-of-jetting micro-vibrating signal,
 - a measuring unit that can measure a continuous operating time of the micro-vibrating unit by the out-of-jetting micro-vibrating controlling unit is provided,
 - a standard-time storing unit that stores a predetermined standard time is provided, and

a signal-generating controlling unit that can compare the continuous operating time and the standard time, and that can cause the signal generating unit to change the out-of-jetting micro-vibrating signal based on result of the comparison is provided.

2. A liquid jetting apparatus according to claim 1, wherein:

the signal-generating controlling unit is adapted to cause the signal generating unit to change the out-of-jetting micro-vibrating signal in such a manner that a frequency of the out-of-jetting micro-vibrating signal is lowered when the continuous operating time becomes longer than the standard time.

3. A liquid jetting apparatus according to claim 2, wherein:

after the frequency of the out-of-jetting micro-vibrating signal has been lowered by the signal generating unit, the signal-generating controlling unit is adapted to cause the signal generating unit to change again the out-of-jetting micro-vibrating signal before a liquid-jetting operation in such a manner that the frequency of the out-of-jetting micro-vibrating signal is returned to an original frequency.

4. A liquid jetting apparatus according to claim 3, wherein:

after the frequency of the out-of-jetting micro-vibrating signal has been returned to the original frequency by the signal generating unit, the out-of-jetting micro-vibrating controlling unit is adapted to cause the micro-vibrating unit to operate based on the out-of-jetting micro-vibrating signal for a predetermined time before the liquid-jetting operation.

5. A liquid jetting apparatus according to claim 1, wherein:

the signal-generating controlling unit is adapted to cause the signal generating unit to change the out-of-jetting micro-vibrating signal in such a manner that an amplitude of the out-of-jetting micro-vibrating signal is lowered when the continuous operating time becomes longer than the standard time.

6. A liquid jetting apparatus according to claim 5, wherein:

after the amplitude of the out-of-jetting micro-vibrating signal has been lowered by the signal generating unit, the signal-generating controlling unit is adapted to cause the signal generating unit to change again the out-of-jetting micro-vibrating signal before a liquid-jetting operation in such a manner that the amplitude of the out-of-jetting micro-vibrating signal is returned to an original amplitude.

7. A liquid jetting apparatus according to claim 6, wherein:

after the amplitude of the out-of-jetting micro-vibrating signal is returned to the original amplitude by the signal generating unit, the out-of-jetting micro-vibrating controlling unit is adapted to cause the micro-vibrating unit to operate based on the out-of-jetting micro-vibrating signal for a predetermined time before the liquid-jetting operation.

8. A liquid jetting apparatus comprising;

a head member having a nozzle,

a scanning mechanism that can cause the head member to relatively move with respect to the medium,

a liquid jetting unit that can jet liquid from the nozzle,

an out-of-jetting micro-vibrating-area setting unit that can set out-of-jetting micro-vibrating areas before and after a liquid-jetting area to which liquid is to be jetted from the nozzle while the head member is caused to relatively move by the scanning mechanism,

a micro-vibrating unit that can cause liquid in the nozzle to minutely vibrate, and

an out-of-jetting micro-vibrating controlling unit that can cause the micro-vibrating unit to operate when the head member is located in the out-of-jetting micro-vibrating areas,

wherein:

a capping mechanism that can seal the nozzle is provided in a relative movable area of the head member,

the out-of-jetting micro-vibrating controlling unit is adapted to cause the micro-vibrating unit to operate during at least a part of time for which the capping mechanism seals the nozzle, and

the out-of-jetting micro-vibrating controlling unit is adapted to repeat a controlling step of causing the micro-vibrating unit to operate for a first constant time and causing the micro-vibrating unit not to operate for a second constant time while the capping mechanism seals the nozzle.

9. A liquid jetting apparatus according to claim 8, further comprising:

a history recording unit that records history information about liquid-jetting operations, and

a time-changing unit that can change at least one of the first constant time and the second constant time, based on the history information about liquid-jetting operations recorded by the history recording unit.

10. A liquid jetting apparatus according to claim 8, further comprising:

an environmental-information obtaining unit that can obtain environmental information around the capping mechanism, and

a time-changing unit that can change at least one of the first constant time and the second constant time, based on the environmental information obtained by the environmental-information obtaining unit.

11. A controlling unit for controlling a liquid jetting apparatus comprising:

a head member having a nozzle, a scanning mechanism that can cause the head member to relatively move with respect to the medium, a liquid jetting unit that can jet liquid from the nozzle, and a micro-vibrating unit that can cause liquid in the nozzle to minutely vibrate; the controlling unit comprising:

an out-of-jetting micro-vibrating-area setting unit that can set out-of-jetting micro-vibrating areas before and after a liquid-jetting area to which liquid is to be jetted from the nozzle while the head member is caused to relatively move by the scanning mechanism,

an out-of-jetting micro-vibrating controlling unit that can cause the micro-vibrating unit to operate when the head member is located in the out-of-jetting micro-vibrating areas, and

a signal generating unit that can generate an out-of-jetting micro-vibrating signal as a periodical signal having a predetermined waveform,

wherein:

the out-of-jetting micro-vibrating controlling unit is adapted to cause the micro-vibrating unit to operate based on the out-of-jetting micro-vibrating signal,

a measuring unit that can measure a continuous operating time of the micro-vibrating unit by the out-of-jetting micro-vibrating controlling unit is provided,

a standard-time storing unit that stores a predetermined standard time is provided, and
 a signal-generating controlling unit that can compare the continuous operating time and the standard time, and that can cause the signal generating unit to change the out-of-jetting micro-vibrating signal based on result of the comparison is provided.

12. A controlling unit for controlling a liquid jetting apparatus comprising: a head member having a nozzle, a scanning mechanism that can cause the head member to relatively move with respect to the medium, a liquid jetting unit that can jet liquid from the nozzle, a micro-vibrating unit that can cause liquid in the nozzle to minutely vibrate, and a capping mechanism that is provided in a relative movable area of the head member and that can seal the nozzle; the controlling unit comprising:

an out-of-jetting micro-vibrating-area setting unit that can set out-of-jetting micro-vibrating areas before and after a liquid-jetting area to which liquid is to be jetted from the nozzle while the head member is caused to relatively move by the scanning mechanism, and

an out-of-jetting micro-vibrating controlling unit that can cause the micro-vibrating unit to operate when the head member is located in the out-of-jetting micro-vibrating areas,

wherein:

the out-of-jetting micro-vibrating controlling unit is adapted to cause the micro-vibrating unit to operate during at least a part of time for which the capping mechanism seals the nozzle, and

the out-of-jetting micro-vibrating controlling unit is adapted to repeat a controlling step of causing the micro-vibrating unit to operate for a first constant time and causing the micro-vibrating unit not to operate for a second constant time while the capping mechanism seals the nozzle.